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AN EFFICIENT ROUND ROBIN ALGORITHM USING IMPROVED TIME QUANTUM

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ABSTRACT

Round Robin Algorithm is a scheduling algorithm in Operating system, used for multitasking systems. In RR algorithm, all the process having same priority and a time quantum after that process is prevented. It executes in ideal way in multitasking systems and each process will be having a same quantity of static time quantum. Based on Time quantum the efficiency of RR algorithm is determined. A complete study and implementation Round Robin algorithm is done and the advance and new version of RR algorithm by allocating the processor to processes in round robin manner using the possible time slice. Computation of the quantum is done by square root of the multiplication of average of the burst time and highest burst time. The practical result of this algorithm also shows that it is better than the Round Robin algorithm by the reduced context switches, diminishing aggregate turnaround time and the average wait time.

KEYWORDS: RR Algorithm, Context Switches, Aggregate Turnaround

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Original Article

INTRODUCTION

As the core part of the computers, The Central Processing Unit should be utilized efficiently. Because of this CPU scheduling [1] is very important and necessary. CPU scheduling is a very much important topic in operating system. Scheduling is sharing of resources of computer in between multiple processes.

A process is a part or object of a program executing in a computer program. It involves all the values of all the registers, program counter and all the variables. Term Ready Queue is a queue in which the all the processes that are waiting to be allocated on a processor. Another term Burst time in which a process is being kept by the central processing unit (CPU). Arrival time is when a process comes to the ready queue. Turn Around time is the time a process is submission to the time it is finished. Waiting time is the time in which process waits in the queue. Another term is context switching, it is the number of CPU is switched form one process to the process. For the optimal and the efficient scheduling algorithm less waiting time and turnaround time and also less context switches.

LITERATURE REVIEW

All the important and useful CPU scheduling algorithm [2] are like First come First serve (FCFS), Shortest Job First (SJF) and Round Robin are describe below.

- **First come First Served (FCFS):** it's a non-preemption algorithm and the algorithm follow the concept of the FIFO approach and in FIFO the process who comes first goes first and the first who come late goes late. So the first come first serve by name it's clear that who comes first serves first.
- **Shortest Job First:** In the shortest job first algorithm all the process are sorted and the process have smallest burst time goes in ready queue first and completes first so it's all about the shortest job, the job who have shortest time complete first.
- **Round Robin Scheduling:** The Round Robin algorithm is modern approach to deal with all the process have different burst time and so to minimize the waiting time and turnaround time we define a new algorithm which is Round Robin which execute a minimum time for each process and then go to the next and continue till all the process are completed. This minimum time is called time slice or time quantum. It is also only CPU scheduling algorithm

The Various Scheduling Parameters [3] Are:

- **Context Switch:** A context switch is like to enter in one process to another process, this is called context switch in CPUscheduling algorithm.
- **Through put:** The throughput is CPU scheduling algorithm is define as inverse to the efficiency and Number of context switches in CPU scheduling process. So more context switching in scheduling algorithm is a cause of decrement in throughput.
- **CPU Utilization:** This is the fraction of time when CPU is in use. CPU utilization is depend on the usage of cpu.
- **Turnaround Time:** This is the total time which is required to complete the whole process in ready queue.
- **Waiting Time:** Waiting time is defined as the total amount of time a process that waits in ready queue.
- **Response Time:** Response time is what when the first time the CPU response to the process like a process comes at t=0 and response at t=5 then response time for that process is 5 second.

EXISTING APPROACH

Round Robin Method[4] is an old, scheduling algorithms in Operating system, mainly for Process scheduling systems. All the processes have the same priority and a time quantum. After that the processes will be beneath preemption. In OS using Round Robin, It will firstly pick up the front process from the ready queue and will set a timer for interrupting. After finishing one time quantum process will be given to the processer. It will compare the burst time of the processor and the time quantum, if the burst time of the processor is lower than the time quantum, then either it will release the processor, or it will stop the execution by raising an input output request. Then the CPU scheduling in OS begin with the next process which will be in the front of ready queue. On the contrary, if the burst time of a process crosses time quantum, then the timer will went to zero after there is a completion of one Time slice, and it prevent the current process and push it to ready queue.

Example is given below

Table 1

Processes	Burst Time
P0	12
P1	23
P2	35
P3	42

We are assuming that the time quantum for the above processes is 10 ns.

Gantt chart for the Round Robin Scheduling is

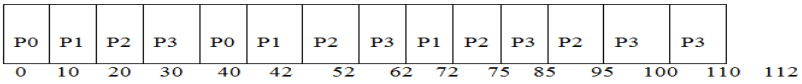

Chart 1: Gantt Chart of RR Scheduling

Total Wait Time = [40-10] + [10-0] + [42-20] + [72-52] + [20-0] + [52-30] + [75-62] + [95-85] + [30-0] + [62-40] + [85-72] + [100-95] = 217

Average Waiting Time: 217/4 = 54.25

Turnaround time = 42 + 75 + 100 + 112 = 329

Average turnaround time = 329/4 =82.25

After getting the result the major disadvantage in Old Round Robin algorithm is AWT and ATAT is high and also the context switching is more, it makes the round robin algorithm very inefficient

PROPOSED MODEL

Working Method

In order to minimize the drawbacks in round robin scheduling algorithm, a new efficient method is proposed.

Pseudo Code for the Proposed New Efficient Round Robin Algorithm

1. Start
2. Calculate the average value of all the burst time
3. Sort all the burst time in ascending order and Find mid value of all the sorted Burst Time and initialize counter=0
4. Now Calculate the Time Quantum for all processes

Time Quantum (TQ) =Floor (Sqrt (average of Burst time * middle element of all burst time))

5. While (ready Queue! =NULL)

Assign TQ to all the processes and if process is completed increment the counter value

6. If counter is less than number of the process go to step 5

End of while

7. Now evaluate the Average Waiting Time and Average Turn around Time for all the given processes.
8. End

Flowchart

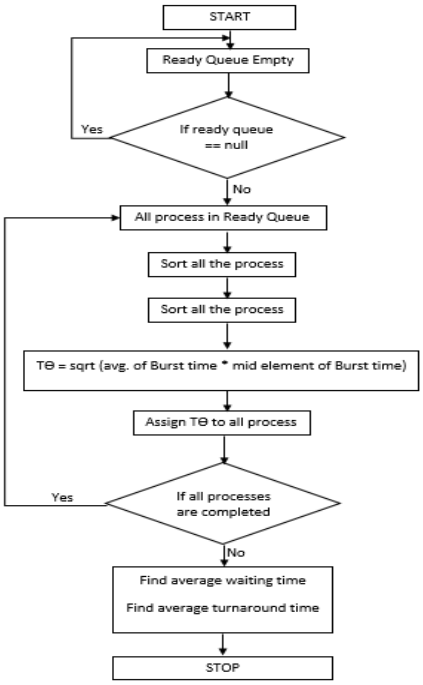

Figure 1: Flow Chart for Algorithm

Let's take the previous example which take in RR algorithm:

Table 2

Process	Burst Time
P1	12
P2	23
P3	35
P4	42

In previous algorithm we assumed that the time quantum is 10 ns but in proposed algorithm Time Quantum is define as:

Time Quantum = floor (sqrt ((sum of burst time) / n) * maximum burst time)

Time quantum is = floor (sqrt (28*42)) = 35

Gantt chart

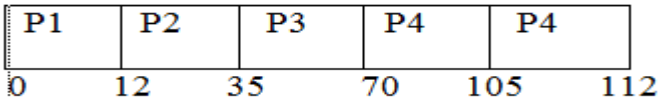

Figure 2: Gantt chart

Average waiting Time = (0+12+35+70) = 117/4 = 29.25

Average Turnaround Time = (12+35+70+112) =229/4 = 57.25

Number of Context Switches = 5

So after getting the result we are seeing that the result of the proposed Round Robin algorithm is lower than the general Round Robin algorithm and also the number of the context switches is too low.

RESULTS AND ANALYSIS

After implementation of proposed algorithm we have following deduction about the work. Firstly it will help to reduce the average waiting time and turnaround time for the process and also reduce the context switching which is an important factor in terms of efficiency because the efficiency is decrease if context switching is increasing to the context switching so it's a much improved algorithm as compare to Existing algorithm and results.

Graph for number of process = 5P1=20 P2=40 P3=50 P4=10 P5=30

Time slice for Round robin is 20

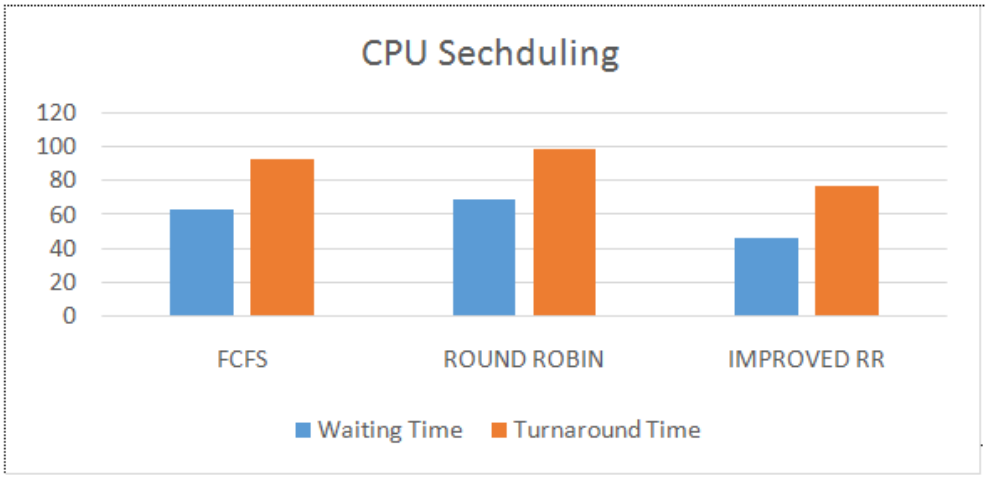

Figure 3

CONCLUSIONS

From the analysis of Results it can say that the proposed " an efficient round robin algorithm using Improved time quantum" gives better results as compared to existing One. It not only reduces Waiting time but also turnaround time. It also uses less number of context switches.

REFERENCES

1. *http://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems/*
2. *http://www.tutorialspoint.com/operating_system/os_process_scheduling.html*
3. *http://research.ijcaonline.org/volume98/number3/pxc3897235.pdf*
4. *https://worldfullofquestions.wordpress.com/2014/07/01/q1-explain-shortest-job-first-sjf/*